The Representation of Time in Clinical Patient Simulations

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Simulated clinical scenarios are generally compressed in time to enhance educational effectiveness and to minimize testing time. Designers should consider how to best control potential sources of distortion in the perception of time and how to best communicate the passage of time to the user.

INTRODUCTION

Clinical scenarios that would normally take days or weeks to unfold can be simulated in minutes, thereby allowing the user to experience several clinical cases in a single session. Despite the universality of time compression in patient simulations, there appears to be little effort in the way of standardizing how time is represented in either the underlying design or to the user.

Patient case simulations often rely on a variety of time progression techniques. For example, time may begin in step with real time and then jump to some point in the future or time may be compressed uniformly from start to finish. Further, the degree and nature of time compression may change from one event to the next.

Conventional simulation paradigms generally approach time as either a continuous, discrete, or mixed continuous/discrete entity. Regardless of how the passage of time is simulated, the user should somehow be made aware of its current value and rate of passage. Our experience with multimedia simulations indicates that there is need to continually display the simulated time, which provides a working context and a sense of urgency that can be advantageous, e.g., in a critical care simulation.

The commonest indicators of simulated time are analog/digital clocks and bar/slider displays. The optimal type of display is a function of the simulation design and the purpose of the simulation, e.g., testing or education. Bar and slider displays can be configured to provide a richer and more intuitive indication of time than can analog/digital clock displays. For example, bar and slider displays can simultaneously provide cues on the time remaining, time since the start of a simulation, and the relative progression of time in the simulation (e.g., what percentage of time is remaining). In addition, since bar and slider displays be calibrated in real or arbitrary time units, in either linear or non-linear markings, they can be used to provide an indication of intentional time distortions.

Although there will always be individual differences in the perception simulated time, a number of factors that influence this perception can be controlled. For example, perceived time is a function of the complexity of a patient case simulation and by the amount of activity required of the user. The more demanded of the user, in terms of navigation, parameter input, and mental processing, the faster both simulated and real times appear to pass. With this is mind, simulation designers can influence the perception of time by controlling simulation complexity, the difficulty of the simulated patient case, and the complexity of the user interface.

DISCUSSION

The simulation and representation of time in patient case simulations has been largely ignored. Given that there are differences in how simulated time progresses, the representation of simulated time is a potential source of user confusion that is compounded by the distortions due to individual differences in time perception. Clearly, the user must be given clues as to how simulated time can be expected to progress, and how their interactions and events within the simulation will affect the passage of time.

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